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ABSTRACT

This study examined the lesson plans of 67 teacher interns in Kentucky to determine the extent to which their lesson objectives were designed to develop higher order thinking skills in their students. Copies of the first lesson plans submitted by first year teachers in one large Kentucky school system for a 3-year period, 1995-1998, constituted the data for this study. Two researchers individually and independently categorized the data into cognitive levels using Bloom's taxonomy. Data analysis found that 41.3% of the new teachers' lesson objectives were at the knowledge level, the lowest cognitive category. Only 3.2% of the teachers' lesson objectives were found to be at the highest level of Bloom's taxonomy, evaluation. Nineteen percent of the objectives were at the comprehension level, the second lowest level of the taxonomy, and application, the third lowest level, accounted for 16.7%. The nest level of the taxonomy, analysis, represented 10.3%. The remaining 9.5% of the objectives were at the synthesis level, which is the second highest level of the taxonomy. Data from the study indicate that the first year teachers in this school district were aiming their teaching primarily at the lowest cognitive levels. The importance of developing through teacher education the skills needed to teach higher order thinking skills is discussed. (Contains 2 tables and 18 references.) (Author/SLD)

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Scholarly Teaching - Application of Bloom's Taxonomy In Kentucky's Classrooms

paper presented

by

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ABSTRACT

This study examined the lesson plans of 67 teacher interns in Kentucky to determine the extent to which their lesson objectives were designed to develop high order thinking skill in their students. Copies of the first lesson plans submitted by first year teachers in one large Kentucy school system for a three-year period,1995-1998, constituted the data for this study. This researcher and a colleague individually and independently categorized the data into cognitive levels using Blooms' taxonomy. Data analysis found that 41.3% of the new teachers' lesson objectives were at the knowledge level, the lowest cognitive category. Only 3.2% of the teachers' lesson objectives were found to be at the highest level of Bloom's hierarchy, evaluation. Nineteen percent of the objectives were at the comprehension level, the second lowest level of the taxonomy. The third lowest level of the hierarchy, application, was16.7%. The next level of the taxonomy, analysis, was at 10.3%. The remaining 9.5% of the objectives were at the synthesis level which is the second highest level of the hierarchy. The data from this study indicated that the first year teachers in this school district were aiming their teaching primarily at the lowest cognitive levels. The importance of developing higher-level thinking skills is discussed. This study points out that if we want new teachers to be able to teach higher order thinking skills we need to develop these skills in teacher education candidates.

Scholarly Teaching - Application of Bloom's Taxonomy In Kentucky's Classrooms

The publication of *A Nation at Risk* (National Commission of Excellence in Education, 1983) led to a movement of educational reform in the United States. Since then, two national level Education Summits have been held. The U. S. Congress has enacted Goals 2000 and Education 2000. The federal initiatives have led to education reform movements at the states' levels. One of the aims of education reform efforts has been to improve the standards of education in the country. The Commonwealth of Kentucky implemented the Kentucky Education Reform Act (KERA) in 1990. This act mandated the most sweeping education reform. Since the implementation of KERA, Kentucky has taken a leadership role in education reform in the United States. KERA specified Learners Expectations to be attained by all students prior to their high school graduation. The Act also established Kentucky New Teacher Standards to be achieved by all teachers prior to their receiving an initial teaching certificate.

One of the fundamental principles guiding reform in Kentucky was that all students were capable of learning at higher levels (Legislative Research Commission, 1997). This study was conducted to determine the extent to which the newly certified teachers in Kentucky were planning to develop higher cognitive skills as defined by Bloom's taxonomy (Bloom, Englehart, Furst, Hill, Krathwohl 1956) in their students. This taxonomy is widely used by experts to define the cognitive levels (Linn & Gronlund, 1995; Popham, 1999; Stiggins, 1994). In Kentucky, all new teacher-graduates of colleges/departments of education, are issued a Certificate of Eligibility. On the strength of this Certificate they are hired as new teachers by the school systems. During their first year of teaching they go through the Kentucky Teacher Internship Program (KTIP) which was implemented in 1985. Each new teacher is assigned a team of three educators which consists of the principal of the intern's school, a master peer teacher, and a teacher educator from a regional university. Each new teacher (KTIP intern) is observed independently by each team member three times during the academic year. Each new teacher is required to submit to the team members a complete copy of her/his lesson plan prior to the observation of the lesson.

Methodology

Copies of the first lesson plans submitted by the first year teachers in one large school system to their KTIP committee members for a three-year period, 1995-1998, were collected for this study. These lesson plans, a total of 67, represented 43 elementary, 15 middle, and 9 high school teachers (KTIP interns). The data was not segregated by college or university from where the interns had graduated. It was also not segregated by the interns' majors or areas of emphasis, or by their gender. Each lesson objective, as given in the lesson plan, was copied on an instrument. This resulted in an instrument which contained 108 objectives. The author and a colleague independently rated each objective using the six categories of Bloom's taxonomy. The instrument containing the objectives and the rating according to Bloom's taxonomy is given in Table 1.

Insert Table 1 about here

A Pearson's r correlation was performed to determine inter-rater reliability between the ratings of the two raters. It resulted in an inter-rater reliability of r = .98. The raters discussed the items on which they disagreed and came to agreement through consensus. Frequencies of ratings in each of the six categories of Bloom's taxonomy were calculated and percentages were computed.

Analysis of data and Results

An analysis of the data found that 41.3% of the objectives were at the knowledge level which is the lowest of the six levels in Bloom's hierarchy. Conversely, 3.2% of the objectives were found to be at the highest level of Bloom's hierarchy. Nineteen percent of the objectives were at the comprehension level, the second lowest level in the taxonomy. The third lowest level of the hierarchy, application, was 16.7%. The next level of the taxonomy, analysis, was next at 10.3%. The remaining 9.5% of the objectives were at the synthesis level which is the second highest level of the hierarchy. These findings are presented in Table 2.

Insert Table 2 about here

According to this analysis, only 23% of the objectives of the 67 first-year teachers in the school district were directed toward the highest three levels of Bloom's taxonomy. And, 77% of the lesson objectives were aimed at the three lowest levels of Bloom's taxonomy.

Discussion

In recent years advancement in technology has contributed to information and knowledge which in the past was unavailable. One area of this new knowledge pertains to the brain. The earlier notion that a child's mental ability was fixed at birth and that nothing could be done to help children improve this ability (Valett, 1978) has been negated by current brain research. Today, there is mounting evidence that the brain has the capacity to change in important ways in response to experience. Current research shows that the brain is not a static entity, and that an individual's capacities are not fixed at birth. The brain itself can be altered through intensive intervention.

The evidence of brain development is documented in the literature for more than two centuries. In the year 1795, an eleven year old lad "Wild boy" was discovered in a French forest by Jean Itard, a physician by training. Itard named him Victor. According to the description given by Itard, Victor was a savage; he was without language and lacked thinking skills and abilities. Itard selected a series of cognitive objectives for Victor. Itard got frustrated with the slow rate of Victor's progress but he did report several specific gains in the boy's ability to think. In 1972, Heber provided evidence of the effect of intervention on the development mental abilities of children. A four-day training session consisting of 20 minutes per day resulted in a mean IQ

score of 124 for the 40 children in the experimental group as compared to the control group mean of 94.

A vast majority of research reported in the literature provides evidence that the first three years are the most critical years for brain development. However, research also shows that the brain's ability to change in the first decade of life is remarkable (Shore, 1997). Evidence presented by Itard shows that the development of thinking skills is possible even beyond the first decade of life.

Academic achievement of children is related to their ability to think. It has long been known that the family structure is an important factor in how well a child learns. The Milwaukee project (Heber, Garber, Harrington, Hoffman, & Falender,1972) showed that when mothers were provided with basic level of education and involved in the teaching of specific language and cognitive skills the mental abilities and achievement scores of their children increased steadily over those in the control group. The decline in the family structure and the increased number of latch-key children in schools today has made the teachers doubly responsible for the development of mental abilities and thinking skills of their students.

Thinking is a continuum. It requires knowledge, information, comprehension, analysis, and synthesis. It requires mental processes of conceiving, manipulating, and dealing abstractly with ideas. According to Valett (1978), most higher order thinking is of an abstract nature. The student must mentally respond to the stimuli presented by analyzing, synthesizing and evaluating. These are the higher order thinking levels of Bloom's taxonomy. Higher order thinking skills are not automatic. They are shaped by numerous cultural experiences and by the nature of educational process itself.

It takes much systematic instruction for students to learn to think at higher level. The data analysis reveal that only 23 % of the lesson objectives written by the first year teachers in their lesson plans are designed to develop higher order thinking skills. The data show that for the most part the first year teachers are not teaching higher level thinking skills to their students. Without these skills the academic achievement of the students is not likely to show significant improvement.

It is said that teachers teach as they have been taught. These data raise some additional questions. Are the new teachers not teaching higher level thinking skills because they do not know how to teach them? Have their teacher preparation programs provided them with experiences in a culture and an educational process which encourages the development of creative thinking? Have these new teachers themselves developed their higher order thinking levels? Are the teacher education candidates competent to think at higher levels? Does the prevailing culture from which a majority of teacher education candidates come encourage the development of higher order thinking skills?

Additional studies are needed to answer many of these questions. Some questions can be answered by teacher educators from their daily experiences with students in education courses. It is generally believed that creative thinking, a form of higher order thinking, involves five stages. These are preparation, incubation, illumination, verification, and refinement.
Preparation requires the acquisition of relevant knowledge and its experience through operations previously discussed. Incubation is a period of "internalization" of knowledge and experience. It occurs when students give themselves adequate time to assimilate and integrate data without undue interference or distraction. After a period of flexible openness the third stage of insight occurs and the person is said to be "illuminated". Verification is the next step and requires functional application of the creative thought. This is followed by a period of reflection, assessment, inner dialogue with one self, and self-feedback. The final stage called refinement emerges from it which continues with each functional application of the thought. Formal education should provide opportunities for each of these stages for creative thinking to occur.

More than half of the teacher education candidates even at the undergraduate level today are simultaneously carrying responsibilities associated with a minimum paid hourly job, family, children, being a single parent, long commute, court appearances related to divorce and/or custody battles, financial problems, etc. They are constantly juggling their time from one place to another and from one responsibility to another. For them, making it through the acquisition stage alone is a challenge. They set the first stage of thinking as a goal and its accomplishment as an ultimate achievement. The lives of these students do not allow them time to "incubate" and "illuminate". The development of higher order thinking skills is not a part of their educational process.

The data suggest that the teacher education programs need to take a careful look at the delivery of educational experiences provided to their candidates. If necessary, they may have to tailor specific experiences to enable their students develop higher order thinking skills. Undergraduate courses in classroom assessment would be a good place to stress Bloom's taxonomy as students learn to write lesson objectives and assessments for these objectives. Additionally, this should be emphasized in method courses. Increasingly, for a variety of reasons, universities are offering courses of short durations. Three credit hour courses delivered over a five-day period do not even facilitate the "incubation", or "internalization", the lowest stages in the afore-mentioned educational process. Teacher education programs need to examine this practice in light of the literature.

Conclusions

The data from this study show that the first year teachers in this school district were primarily teaching at the lowest cognitive levels of Bloom's taxonomy. Very few new teachers were planning to teach at higher cognitive levels. These data point out that if we want the new teachers to be able to teach higher order thinking skills we need to develop these skills in teacher education candidates. However, the data need to be interpreted carefully and cautiously. The limitations of the study need to be borne in mind. The data for this study were obtained from only one Kentucky school district. The results must be generalized with care. It is also important to remember that the lesson objectives analyzed here were taken from first year teachers. Teachers develop as they grow in the profession. Their skills grow with continued professional development. The data have raised some important questions which merit answers. Further research is necessary to answer these questions. A replication of this study using lesson objectives written by experienced teachers will provide a more reliable information on the subject. A replication of the study using the objectives as given in the syllabi of education courses required in the teacher preparation programs will also provide valuable information.

The usual solutions of higher salaries, fewer students per teacher, longer school day, and the like may to some extent improve the instruction provided to students in grade school. This improvement may not be enough to produce "world class citizens" which is the goal of KERA. To improve the overall standard of education it is necessary that students learn to think and operate at higher cognitive levels and their ability to do so is dependent on their teachers' ability to do the same.

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Table 1. Lesson Objective Ratings by Bloom's Taxonomy of Cognitive Levels

1.	Students will have a better understanding of telling time; measuring, recording and comparing lengths, and naming opposites.	2
2.	Students will be able to follow direction both oral and written.	2
3.	Students will be able to successfully complete a recipe.	2
4.	Students will be able to evaluate the success of their cooking skills.	6
5.	Students will be able to identify given words in a jumble of letters.	1
6.	The students will be able to correctly apply the inflectional ending, -ing to words in order to show action in the present.	3
7.	Students will be able to place objects by properties in a Venn Diagram.	1
8.	The students will be able to estimate and count successfully the number of items contained in a zip-lock bag recording the results using place value.	2
	Students will be able to make a list of nouns plurals by adding "s" or "es."	1
9.	The students will construct place value models to represent numbers	3
10.	Students will exhibit understanding of place value by writing numbers in standard form and expanded form.	2
11.	To add and subtract money values relating to a real situation. To find the total value of a collection of coins and bills.	3
12.	To be able to repeat a given word and find a corresponding picture using only listening skills.	1
13.	Students will learn basic facts about the sun.	1
14.	Students will realize without the sun there would be no green plants.	1
15.	Students will know various ways the sun helps us.	1
16.	Students will realize that the sun is the largest star to the earth.	1
17.	Students will be able to organize their thinking and create lists of equations using patterns.	3
18.		
19.	The students will be able to sort buttons according to color, size, or shape.	1
20.	The students will be able to construct a graph.	4
21.	The students will be able to identify antonyms.	1
22.	Students will be able to gain a better understanding about what kinds of persuasive articles are out there and notice some of their characteristics.	2
23.	The students will create a brochure or advertisement to convince others to go somewhere for spring break by using their creative writing assignment.	5
24.	To create a magazine related to health issues.	5
25.	To research materials pertaining to health issues of your group.	3
26.	To create an article for the magazine.	3
27.	To present the article to class.	5
28.	The students will orally study and answer questions about the sample job application, and complete their own application for employment.	3
29.	To learn features of block style letters.	1
30.	To process personal business letters in block format.	2
31.	Students will learn how stems are necessary to plants.	2

32.	Students will be able to define infectious diseases.	1
33.	Students will be able to list body parts, which may be affected by an infectious disease.	1
34.	The student will name a person in the school.	1
35.	The student will tell what that person does in school.	1
36.	Trainers will write a story.	5
37.	Students will predict what happens when vinegar and bicarbonate of soda are mixed.	3
38.	Students will predict what happens when vinegar and bicarbonate of soda are mixed in various sizes of containers.	3
39.	Each student will actively participate in oral discussion about the Southeastern States and apply his/her knowledge of directional terms to questions concerning this region.	3
40.	The students will be able to count to one dollar ($1.00) using different coin combinations.	1
41.	The students will be able to choose what would be appropriate to wear in the rain.	4
42.	Students will describe the laws that angered the colonist.	1
43.	Students will be able to describe how the colonists showed their anger toward British control.	1
44.	Students will be able to describe the First Continental Congress.	1
45.	To learn the reach technique for W and Right Shift.	1
46.	To combine smoothly W and Right Shift with other learned keys.	5
47.	After listening to the story, the students will work together to complete a story map chart.	4
48.	The student will also write about and illustrate their favorite part of the story.	5
49.	Students will be able to recognize how singular and plural nouns are made possessive.	4
50.	Students will be able to correctly use singular and plural possessive nouns in their writing.	3
51.	Students will be able to distinguish between fact and opinion statements.	4
52.	Students will be able to use homophones correctly in given sentences.	3
53.	The student will conduct tests and interpret results to determine if certain foods contain proteins.	6
54.	The students will work in cooperative groups to perform an experiment to determine if soda is less or more dense than water.	6
55.	Students will take part in a water cycle experiment and will construct a water cycle wheel model to exhibit this knowledge.	3
56.	The students will be able to create a page for a class book by writing a sentence to describe a time when their relatives came to stay with them.	1
57.	Students will estimate the number of seeds within a pumpkin that will be proved by the teacher.	2

58.	Students will individually count seeds within their section of the pumpkin.	1
	Students will use individual methods of counting to count the seeds within their sections.	1
59.	The students will determine how to multiply two digits numbers by a two digit number by working samples on the board.	3
60.	The students will accomplish the activity by using mathematical ideas and procedures to reason and solve problems and also understand number concepts including the properties and logic of various mathematical systems.	3
61.	The students will create a picture by illustrating a story.	5
62.	Students will demonstrate knowledge in the addition of fractions with unlike denominators.	4
63.	To be able to call his/her home or school from the community if the need arises.	3
64.	The students will define and measure volume, mass, and density.	1
65.	Describe what kind of boat they would build from the two given substances and why.	4
66.	Students will use colored pencils and graph paper to implement the problem-solving strategies of "Draw a Picture" and "Solve a Simpler Problem," and make connections to algebraic reasoning.	4
67.	The student will review previous knowledge of The Sign of the Beaver.	1
68.	The student will learn new vocabulary words within their section.	1
69.	The students will read along silently with audio tape of the story.	1
70.	The student will discuss story content.	1
71.	The students will discuss story content.	2
72.	Students will draw and calculate the area of various rectangles with the same perimeter.	3
73.	To allow the students the opportunity to explore, create and market products of their choice relating to technology: - Product description - Target Market - Advertising (Design) - Sales	5
74.	Identify and describe the functions of the cell parts.	1
75.	Differentiate between plant and animal cells.	2
76.	Sketch a diagram of a plant and an animal cell.	4
77.	Students will write a business letter following format to practice for writing a letter to the Reviewer of their portfolio.	2
78.	Students will view a brief video that describes Western settlements and will participate in a brief role playing exercise that demonstrates the differences in the way that Native Americans and settlers regarded land and treaties.	3
79	The students will discover events that lead into the Industrial Revolution.	3
80.	The students will be able to describe l of 5 new events from the Industrial	

	Revolution.	1
81.	Students will be able to recognize a piece written to persuade the reader.	2
82.	Students will be able to identify common words and techniques that help the writer to persuade the reader.	1
83.	Students will be able to differentiate between positive and negative persuasions.	2
84.	List "needs" versus "wants" in an individual basis.	1
85.	Identify factors that will influence the teenager's consumer choices.	1
86.	Apply the "pros" and "cons" of borrowing money to real-life situations.	3
87.	Students will be introduced to measuring by inches.	1
88.	Students will develop their abilities for estimating and measuring the lengths of various objects.	2
89.	Students will gain new knowledge of measurement through investigation.	1
90.	Students will be able to recognize and communicate what an inch is.	2
91.	To read "Make-Believe Animals" and complete comprehension worksheet.	2
92.	To demonstrate knowledge of database by setting up and creating database from scratch.	5
93.	To integrate knowledge of word processing and database.	5
94.	Students will participate in an activity that will explain the Missouri	
95.	Compromise and the rise of sectionalism in the Nineteenth century.	2
96.	The students will be able to follow Alexander on his spending spree, and then determine how they would spend a dollar.	2
97.	The students will be able to sort a group of objects by shape/color and show results of number of objects in each group in graph form.	4
98.	The students will be able to complete extended number patterns using multiples of three.	3
99.	The students will illustrate various forms of fraction knowledge with marker boards.	1
100.	The students will be given a teacher constructed assessment over fractions.	
101.	The students will be able to recognize complete sentences.	1
102.	Students will demonstrate basic awareness of good dental health habits and facts about teeth.	3
103.	Students will improve fine motor coordination by manipulating a toothbrush to "paint/brush" the enamel onto their tooth picture.	
104.	Students will correctly write their first and last name without the use of a model.	1
105.	The student will maintain or improve cardiorespiratory endurance.	3
106.	The student will be able to describe how blood is pumped through the four chambers of the heart and name the chambers.	1
107.	The student will be able to identify benefits of regular participation in physical activity.	1
108.	The student will be able to identify benefits of regular participation in physical activity.	1

Table 2. Percentages of Objectives by Bloom's Taxonomy

Highest cognitive level	6	Evaluation.....	3.2%
	5	Synthesis.....	9.5%
	4	Analysis	10.3%
	3	Application	16.7%
	2	Comprehension.....	19%
Lowest cognitive level	1	Knowledge.....	41.3%

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